

the alloy flow velocity is at a level significantly below the level at the outlet end of the runner and such that, on filling of the die cavity, the alloy is able to undergo solidification in the die cavity and back along the flow path towards the runner; and

- 5 wherein said form is such that the FEM increases in transverse cross-sectional area in a direction extending beyond the outlet end of the runner, whereby the decrease in alloy flow velocity is able to preclude a change of state of the alloy from a molten state to a semi-solid state exhibiting thixotropic properties.

10 Additionally, the invention provides a pressure casting machine for high pressure die casting of alloys, wherein the machine has, or operable to provide, a pressurised source of molten alloy, a mould defining at least one die cavity, and a metal flow device which defines a metal flow path by which alloy received from the pressurised source is able to flow into the die cavity, wherein:

- 15 (a) a first part of the length of the flow path includes or comprises a runner; and  
(b) a second part of the length of the flow path from an outlet end of the runner includes a flow-path exit module (FEM); and

wherein the FEM has a form which controls the alloy flow whereby the alloy flow velocity decreases progressively from the level at the outlet end of the runner  
20 whereby, at a location at which the flow path communicates with the die cavity, the alloy flow velocity is at a level significantly below the level at the outlet end of the runner and such that, on filling of the die cavity, the alloy is able to undergo solidification in the die cavity and back along the flow path towards the runner; and

- 25 wherein said form is such that the FEM increases in transverse cross-sectional area in a direction extending beyond the outlet end of the runner, whereby the decrease in alloy flow velocity is able to preclude a change of state of the alloy from a molten state to a semi-solid state exhibiting thixotropic properties

The invention also provides a method of producing alloy castings using a  
30 high pressure die casting machine having, or operable to provide, a pressurised source of molten alloy and a mould defining at least one die cavity, in which the alloy flows from the source to the die cavity along a flow path, wherein:

- (a) the alloy, in a first part of the flow path, is caused to flow along a runner; and

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- (b) in a second part of the flow path, between the first part and the die cavity, the alloy flow is controlled whereby the flow velocity progressively decreases from the level at an outlet end of the runner to a flow velocity where the flow path communicates with the die cavity which is at a level significantly below the level at the outlet of the runner; and

wherein said control is such that, in the FEM, the alloy flow is increased in transverse cross-sectional area in a direction extending beyond the outlet end of the runner, whereby the decrease in alloy flow velocity precludes a change of state of the alloy from a molten state to a semi-solid state exhibiting thixotropic properties.

As indicated, the second part of the flow path decreases the alloy flow velocity below the flow velocity level at the outlet end of the runner. The second